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High-Tech Pipeline To Moscow

The Soviets have developed a variety of ways, legal and illegal, to get their hands on U.S. technical know-how. Once obtained, this know-how saves the Russians the cost and time of research and development. When adapted to military use, it can also give them an arms advantage that may cost us billions to overcome.

When a U.S. firm sold the Soviets ultra-precise ball-bearing grinders, for example, they used them to make bearings for their SS19 missile-guidance systems. The improved accuracy achieved through those guidance systems is a major reason why the United States is considering a multibillion-dollar MX missile system.

Now a secret Pentagon document has detailed the full range of high-technology items that our intelligence community believes the Soviet Union has bought, borrowed or stolen from the United States.

A classified chart lists what are believed to be "Notable Successes" in 13 "Key Technology Areas." This list, shown to my associate, Dale Van Atta, is treated by the Pentagon as highly sensitive. Here are a few of the high-tech secrets that have reached the Kremlin:

- **Electro-optic sensors:** Through clandestine means, the Russians have acquired "information on U.S. reconnaissance satellite technology." And through illegal trade links, they have obtained "laser range findings for tanks."

- **Radar:** Air-defense radars and antenna designs for a missile system have fallen into Soviet hands. The document also conjectures that the Soviets have discovered other U.S. breakthroughs through "exploitation of captured terrain-following and airborne-intercept radar."

- **Anti-submarine devices:** Somehow the Soviets have acquired "underwater navigation and direction-finding acoustic sensors" vital for anti-submarine warfare.

- **Propulsion:** The Russians have obtained "missile case filament-winding technology

through legal and illegal trade, some ground-propulsion technology (diesels, turbines, rotaries) through illegal trade."

- **Materials:** The Russians have acquired "Western titanium alloys and welding equipment" designed to make nuclear missiles and vital weaponry from the hardest possible material.

- **Energy Storage:** The Soviets have acquired, through legal means, high-tech Western "superconducting energy storage systems and associated cryogenic equipment."

- **Navigation:** The Soviet coup here includes: "legal and illegal trade acquisitions of navigation receivers; illegal acquisitions of advanced inertial guidance components, including miniature and laser gyros; captured equipment, including terrain-following radars, anti-radiation missiles, and fire-control systems; acquisitions of cruise and tactical ballistic missile guidance subsystems."

- **Directed energy:** The Soviets have had alarming success in obtaining technology that could make a critical difference in space warfare. That technology covers the "directed energy" field, including lasers and charged-particle weapons. The Russians have secured "metal foils and optical components through legal and illegal channels, including special optical mirrors and mirror technology capable of withstanding high-power laser radiation and suitable for future laser weapons."

- **Production:** The Soviets have also obtained "automated and precision manufacturing equipment for electronics, materials, and possible optical and laser weapon components; acquisition of information on production technology related to weapons, ammunition, aircraft parts, turbine blades, computers, and electronic components."

- **Signal processing:** In this super-secret field, which involves decoding the signals the United States gets from its own and Russian satellites and receivers, the Soviets are believed to have acquired "processing equipment and know-how" through "illegal trade" efforts (secretly obtaining it from a country that bought it from the United States or by somehow diverting the shipments).

- **Micro-electronics:** In this field, the technology acquired by the Russians through "legal or illegal trade channels" includes: "complete industrial processes and semiconductor manufacturing equipment."

- **Computers:** Here the document cites "legal and illegal" acquisitions of complete systems, hardware and software, including a wide variety of Western mini-computers for use in military systems; [and] exploitation of captured avionics and weapons fire-control systems.

A separate Pentagon document lists 19 ways the Soviets obtain U.S. military and industrial secrets. Legal methods range from studying patent applications to joint ventures with Western firms to buying entire factories and copying them piece by piece.

Illegal methods span the spectrum from outright theft by KGB agents to industrial espionage to "end-user diversions." The last refers to using legally purchased U.S. technology for military purposes in direct violation of the purchase agreement.

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